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10 **P&G CASE NO. 7903M**

SELECTIVELY REINFORCEABLE CONTAINER

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CROSS REFERENCE TO RELATED APPLICATIONS

20 This application claims the benefit of U.S. Provisional Application No. 60/175,626 filed January 11, 2000.

FIELD OF INVENTION

25 This invention is directed to containers for storage of objects, and more particularly, to containers which are reversibly reinforceable.

BACKGROUND OF THE INVENTION

30 Various containers are known in the art. For example, commonly assigned U.S. Pat. No. 5,379,897 iss. Jan. 10, 1995 to Muckenfuhs et al., incorporated herein by reference, discloses a resiliently deformable package. However, this package does not have auxiliary reinforcement means for use with the container.

35 U.S. Pat. No. 5,099,939, iss. Apr. 23, 1991 to Goldberg, discloses a vessel comprising a composite of paperboard and polymer film. U.S. Pat. 4,801,017, iss. Jan. 31, 1989 to Artusi, discloses a container comprising a tray surrounded by a blank and at least partially joined to the tray. However, selected portions of the blank are not selectively and reversibly attachable to the tray.

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SUMMARY OF THE INVENTION

The invention comprises a container having a plurality of upstanding sidewalls interconnected by a floor pan. At least one of the sidewalls is reinforceable with an upstanding strut. The strut is removable from the sidewall, without separation from the container in one particular embodiment.

In one embodiment, a pair of the sidewalls may be reinforced with removable struts, the struts being transformable from a first position providing reinforcement to the sidewalls to a second position where the struts do not provide reinforcement to the sidewalls. The struts may be transformable between the first and second positions by articulation.

In another embodiment, the invention comprises a method of assembling a collapsed container. The method of comprising the steps of providing a container having sidewalls interconnected by a floor pan. The container further comprises struts attachable to the sidewalls and removable therefrom optionally without separation from the container. The struts are not attached to the sidewalls. The struts have a proximal end joined to the container at a distal end articulable about the proximal end. The struts are articulated to a position proximate the sidewalls whereby the struts are disposed in a plane substantially parallel to the sidewalls. The struts, and preferably the distal ends thereof, may then be attached to the sidewalls.

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BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a container according to the present invention and illustrating an optional cover.

Fig. 2 is an exploded perspective view of the container of Fig. 1 showing the reinforcement separated from the container.

Fig. 3 is a perspective view of the container of Fig. 1 with the reinforcement attached to the container and in the reinforcing position.

Fig. 4 is a perspective view of the container and reinforcement, the left-hand strut of the reinforcement being in the reinforcing position, the right-hand strut of the reinforcement being removed from the sidewall and not being in a reinforcing position.

Fig. 5 is a bottom plan view of the container showing the reinforcement articulated to a nonreinforcing position.

DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 depicts a preferred embodiment of a container 10 and associated reinforcement 40 according to the present invention. In the embodiment depicted in Fig. 1, the container 10 includes a container 10 body preferably unitarily formed from sheet material. An optional cover 12 may be included and unitarily formed with the container 10. The container 10 may also include a closure for sealing the cover 12 and container 10. The cover 12 may be generally flat, as illustrated, or may have a convex inward or convex outward orientation, as desired. If the optional cover 12 and seal 14 are desired, a plug seal 14 may be utilized as is known in the art and illustrated by U.S. Patent Nos. 3,784,055, iss. Jan. 8, 1974 to Anderson, and 3,967,756, iss. July 19, 1976 to Barish, both of which are incorporated herein by reference. However, it is to be recognized that the cover 12 is an auxiliary feature and does not form part of the claimed invention. For certain embodiments, it is preferred that the cover 12 be substantially flat so that the container 10 is stackable.

The container 10 according to the present invention may be relatively small, such that the container 10 may be stored in one's pocket or purse. Such a container 10 may include the optional cover 12 and be useful for storing pills, capsules, etc. Alternatively, the container 10 may be relatively large such that the container 10 is sized to fit a flat bed semi-truck. Such a container 10 may be useful for carrying construction materials, etc. One contemplated use for the container 10, particularly when the optional cover 12 and a further optional seal 14 are included, is to store perishable items such as food.

The container 10 comprises a floor pan 22 and sidewalls 20 projecting outwardly from the floor pan 22. Preferably, in use, the sidewalls 20 project upwardly and terminate

5 at a distal end 46 forming the mouth 26 or opening of the container 10. The illustrated embodiment has four sidewalls 20. However, it is to be recognized the invention is not so limited.

The floor pan 22 defines and lies in the first plane. For the embodiment illustrated, the floor pan 22 is defined by the vertices of the four corners of the upstanding
 10 sidewalls 20. The floor pan 22 may be domed convex inwardly to increase strength as is known in the art. Particularly, domed floor pans 22 provide increased strength for loading by the contents of the container 10 in a direction normal to the plane of the floor pan 22. Alternatively, the floor pan 22 may be disposed convex outwardly, although this may decrease stability when the container 10 rests on a horizontal surface. It is to be
 15 recognized that the floor pan 22 may be domed and still define a plane.

Referring to Fig. 2, the container 10 is provided with a reinforcement 40. Particularly, the reinforcement 40 may comprise struts 42 which support one or more respective sidewalls 20 and preferably a floor pan support 48. The struts 42 may be utilized to support either self-supporting, reversibly articulable sidewalls 20, flaccid
 20 sidewalls 20, or combinations thereof.

Further, the struts 42 may be articulable so that they may be applied to and removed from the sidewalls 20 as desired. Preferably, the struts 42 are articulable about a proximal end 44, the proximal end 44 being juxtaposed with the floor pan 22. The distal end 46 of the strut 42 may engage the sidewall 20, a flange circumjacent the mouth 26 of
 25 the container 10, or any other point near the top or opening of the container 10 which is convenient and provides structural support to resist collapse of the container 10.

Further, the reinforcement 40 preferably further comprises one or more floor pan supports 48. The floor pan supports 48 extend partially, or preferably completely across the length, and optionally across the width of the floor pan 22. If the floor pan 22 has an
 30 aspect ratio greater than one, preferably the floor pan support 48 extends throughout and in the direction of the major axis.

Referring to Figs. 2-3, preferably, the struts 42 and floor pan support 48 comprise a single, unitary and integral piece of material as illustrated. The reinforcement 40, thus comprises a contiguous planar member which in turn comprises one or more struts 42 and

5 the floor pan support 48. This arrangement provides the benefit that the reinforcement 40 may be manufactured as a single element. Further, attachment of the reinforcement 40 to the container 10 is simplified. For example, in the embodiment illustrated, the floor pan support 48 may be joined to the bottom of the floor pan 22 of the container 10. Joining may be accomplished using any suitable means such as heat sealing, although ultrasonic
10 welding, adhesive, etc., may be used

Referring to Figs. 3-4, the struts 42 which reinforce the sidewalls 20 may be transformable between the first and second positions using a number of known means. For example, the struts 42 may slidably engage the sidewalls 20 by translation relative thereto. Alternatively and preferably, the strut 42 may be articulably joined to its
15 respective sidewall 20 at the proximal end 44 of the strut 42. More preferably, the proximal end 44 of the strut 42 is joined to the container 10 at a hinge juxtaposed with the floor pan 22. This arrangements allows the strut 42 to support the entire length of the sidewall 20 between the floor pan 22 and the opening 26 at the top of the container 10. By supporting the entire length, the full depth of the sidewall 20 is reinforced. This
20 arrangement becomes more important when the container 10 is reversibly collapsible and erectable as described hereinbelow.

The distal end 46 of the strut 42 may be attachable to the container 10 using any of or combinations of several known means, such as frictional engagement, adhesive attachment, cohesive attachment, hook and loop fasteners, tab-slot arrangements, etc.
25 Any means for removably attaching the distal end 46 of the strut 42 to the container 10 is suitable. Preferably, attachment of the strut 42 to the container 10 causes one or more sensory indicia to occur to the user. The sensory indicia may be visual, audible or tactile. Sensory indicia occur when the strut 42 is joined to the container 10 using any mechanical engagement, such as tab-slot arrangements.

30 The container 10 may have a circumjacent flange. The flange may be usable for providing a sealing means if the optional cover 12 is provided with the container 10. Alternatively, the flange, either with or without the optional cover 12, may be usable for gripping the container 10, opening and closing the optional cover 12, etc. It is to be recognized the strut 42 may be attachable to the container 10 at locations intermediate the

5 proximal and distal ends 46 of the strut 42. However, attachment of the strut 42 at the distal end 46 is convenient and provides fixed points spaced apart so that the strut 42 does not comprise a cantilevered support geometry.

Referring to Figs. 4-5, the struts 42 may be articulated to a position which does not provide reinforcement 40 to the sidewall 20, and even be releasably attached to the floor pan 22 or to the floor pan support 48. Particularly, the struts 42 are preferably
10 removably attachable to the outer surface of the container 10, although arrangements having the struts 42 removably attachable to the inner surface of the container 10 are contemplated as described below. This arrangement allows for storage of the container 10 without interference from the struts 42 when not in use.

15 The strut 42 may be disposed in the form of a panel. The strut 42 is considered to comprise a panel if the strut 42 has a width at least 75% of the width of the respective sidewall 20 which the strut 42 reinforces. If so, such a panel is optionally substantially coextensive of and attachable to the sidewall 20 of the container 10. This arrangement provides a strut 42 which provides support throughout the entire width of the upstanding
20 sidewall 20. It is to be recognized that, however, the stiffness of the strut 42 is a linear function of its width and a cubic function of its thickness for bending moments perpendicular to the strut 42. Accordingly, the strut 42 may be optionally reinforced as described hereinbelow.

It is to be recognized that the container 10 may have a rectangular footprint and/or rectangular sidewalls 20. If so, the height may be greater than the width of the sidewalls 20, or vice versa, as desired for the particular geometry under consideration. Further, the strut 42 may be perforate. A perforate strut 42 provides the benefit that, when used in conjunction with a transparent container 10, the user may more easily view contents of the container 10 disposed behind the strut 42.

30 Referring to Figs. 2, 3, 4, and 5, the reinforcement 40 preferably further comprises a floor pan support 48, for reinforcing the floor pan 22 as described above. If so, preferably the strut 42 or struts 42 and floor pan support 48 are contiguous and comprised of an integral piece of material as described above. The container 10, as illustrated, may have a major axis and minor axis opposed thereto, although any geometry and

5 configuration may be utilized without deviation from the claimed invention. If the container 10 has a major axis and minor axis, preferably the floor pan support 48 heterogeneously reinforces the floor pan 22 in a direction substantially parallel to the major axis. The heterogeneous support along the major axis is preferred because it reinforces the longest unsupported span of the floor pan 22.

10 Likewise, the struts 42 may heterogeneously support the container 10 in a direction having a vector component normal to, and preferably identically normal to the floor pan 22. This arrangement provides resistance to bending and unintended collapse when the container 10 is in use. Suitable materials for reinforcing the container 10 include single- face and double-face fluted cardboard, polymeric materials similar or
15 identical to that used for the container 10, etc. If cardboard, paperboard, or other cellulosic materials are selected for the struts 42 and/or floor pan support 48, such material may be sized or provided with a hydrophobic coating to prevent degradation due to moisture, washing, etc.

In a preferred embodiment, the container 10 comprises a first material and the
20 reinforcement 40 comprises a second material, the first and second materials being dissimilar. Each is tailored to its specific function. For example, the container 10 may comprise a material which is impermeable and prevents evaporation or spoilage of liquid contents contained therein. The struts 42 may comprise a heterogeneous reinforcing material suited for articulation about a hinge line 30. Thus, using the claimed
25 arrangement, each material may be tailored to the specific properties which will be helpful at the point of use.

The first and second materials may be of identical composition but dissimilar geometries, for example, the container 10 may be comprised of a polymeric material having a first gauge. The struts 42 and/or floor pan support 48 may be comprised of a
30 polymeric material having a second gauge. The second gauge may be greater than the first gauge. This arrangement allows the container 10 to be formed of a thinner gauge material for material savings. Concomitantly, the reinforcing struts 42 and/or floor pan support 48 may comprise a thicker gauge material for strength.

5 If desired, the strut 42 may further comprise notches 34, undulations, tabs, or handles for gripping and manipulation of the strut 42. This arrangement provides the benefit that the strut 42 may be more easily manipulated and, hence, more easily transformed between the first and second positions. If desired, the strut 42 may be of variable cross section. For example, the strut 42 may have a cross section which provides
10 a greater bending modulus at the proximal end 44 of the strut 42 than at the distal end 46. Likewise, the container 10 may comprise variable wall thicknesses to provide additional rigidity, as desired.

 The reinforcement 40 may be joined to the inner surface of the container 10, to prevent the reinforcement 40 from inadvertently becoming entangled with nearby objects.
15 Preferably, the reinforcement 40 is joined to the outer surface of the container 10, so that the contents of the container 10 may be easily removed and the container 10 easily cleaned. The container 10 may optionally be reversibly collapsible and erectable. If so, the container 10 has a first volume associated with its collapsed condition. The container 10 further has a second volume associated with its erected condition. The
20 second volume is greater than the first. The container 10 may be collapsed in stages as the contents are depleted. This provides the benefits of requiring less storage space and removing oxygen from the container 10 if perishable contents are stored therein.

 The container 10 may be optionally reversible transformable between collapsed and erected conditions in any number of manners. In a preferred embodiment, at least
25 one, and preferably each sidewall 20 has a hinge line 30 disposed substantially parallel to the plane of the floor. The hinge line 30 divides the sidewall 20 into upper and lower portions, each of which is articulable about the hinge lines 30 when the container 10 is transformed between the collapsed and erected conditions. Alternatively, the container 10 may be transformable between collapsed and erected conditions, as illustrated by
30 commonly assigned U.S. Pat. No. 5,996,882, iss. Dec. 7, 1999 to Randall, and incorporated herein by reference.

 In an alternative embodiment, the strut 42 may be totally separable from the container 10. In such an embodiment, the strut 42 has separate attachment means at both the proximal end 44 and distal end 46 of the strut 42. Additionally, the strut 42 may be

5 attached to the container 10 at positions intermediate the proximal and distal ends 44, 46. Attachment at the proximal end 44, distal end 46, and intermediate position may be accomplished using any of the aforementioned and known means. If desired, the struts 42 may be articulated until they contact, and even be joined, to the outwardly facing surface of the floor pan support 48, as illustrated in Fig. 5.

10 While the illustrated embodiments disclose two sidewalls 20 which are reinforced with the struts 42, one of ordinary skill will recognize that one sidewall 20, all sidewalls 20, or any combination therebetween may be reinforced by the struts 42. Additionally, the container 10 may be provided with two floor pan supports 48. If the floor pan supports 48 heterogeneously reinforce the floor pan 22, the heterogeneous reinforcement
15 may be applied in mutually orthogonal directions, to provide more consistent support across the floor pan 22. Of course, as noted above, the invention is not limited to containers 10 having four sidewalls 20.

In a further variation, it is not necessary that the proximal end 44 of the strut 42 be juxtaposed with the floor pan 22. The strut 42 may be articulated about the top or a
20 position juxtaposed with the aperture 26 of the container 10. Alternatively, the container 10 may have a plurality of struts 42. Some of the struts may be articulated about a proximal end 44 juxtaposed with the floor pan 22, while other struts 42 articulate about a proximal end 44 juxtaposed with the top of the container 10, and still other struts 42 articulate about an intermediate position. All such variations are contemplated and within
25 the scope of the appended claims.